

**Problem 3** [10 points]

- (a) A piano tuner is testing a middle *A* on the piano against a standard tuning fork with exact frequency of 440Hz. She hears four beats per second and starts to decrease the tension in the piano cord. The beats increase to five per second. What is the frequency of the vibration of the cord before and after her adjustment?
- (b) What must the piano tuner do next to correctly tune the piano?

**Problem 4**

A sound source emits two sinusoidal sound waves, both of wavelength  $\lambda$  along the paths *A* and *B* in the figure below. The sound traveling along path *B* is reflected from five surfaces as shown and then emerges at point *Q* with the sound traveled along path *A*.

- (a) For what values of  $d$  (in wave lengths) are the waves exactly out of phase when they emerge at point *Q*?
- (b) For what values of  $d$  are the waves exactly in phase at point *Q*?

